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PATENT ABSTRACTS OF JAPAN

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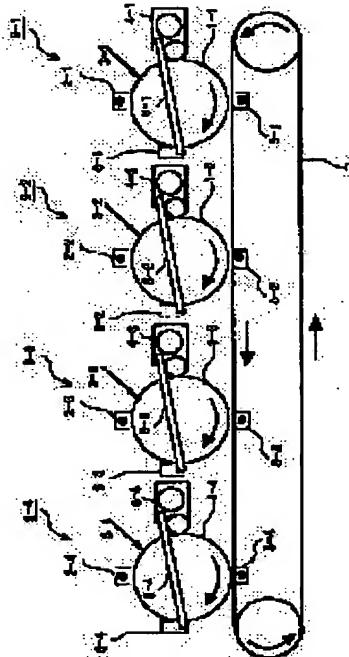
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(54) COLOR IMAGE FORMING DEVICE

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a color image forming device making the satisfactory color image possible to be formed over a long period by performing toner recycle, in reducing the development trouble derived from the color mixture of the toner, in the color image forming device, respectively provided with plural independent image-forming parts for each color.

SOLUTION: In this color image forming device performing the toner recycle, the charge polarity of respective color toner is made the same thereto. Then, binding resin and particle size distribution of the respective color the toner is made the same thereto. Moreover, developing means 4-1, 4-2, 4-3 and 4-4 is respectively set to identical specifications. Furthermore, in the case of adopting the two component developer, each carrier in the color developers is made identical.



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CLAIMS

[Claim(s)]

[Claim 1] Two or more image support by which an electrostatic latent image is formed in the surface A coloring agent which corresponds an electrostatic latent image which held two or more developers which consist of a mutually different coloring agent, and was formed in each of two or more of said image support It is color picture formation equipment equipped with the above, and a coloring agent with which said two or more developers differ is characterized by having the same electrification polarity.

[Claim 2] A coloring agent with which said two or more developers differ is color picture formation equipment according to claim 1 characterized by having the same binding resin.

[Claim 3] A coloring agent with which said two or more developers differ is color picture formation equipment according to claim 1 or 2 characterized by having almost same particle size distribution.

[Claim 4] Said developer is claim 1 characterized by having the same specification, and color picture formation equipment according to claim 2 or 3.

[Claim 5] Said developer is claim 1 characterized by being the 2 component developer which holds a two component developer which consists of a toner and a carrier, and said two or more developers having the same carrier, claim 2, and color picture formation equipment according to claim 3 or 4.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] This invention develops the electrostatic latent image formed on image support with the developer of each color, and relates to full color image formation equipments, such as a copying machine which obtains the full color last image, a printer, and facsimile.

[0002]

[Description of the Prior Art] After electrifying uniformly the surface of the photo conductor which has a sensitization layer in the image formation equipment of an electrophotography method generally, image exposure is performed, an electrostatic latent image is formed on the surface of a photo conductor, this electrostatic latent image is developed with a toner, a toner image is formed, this toner image is further imprinted to a transfer paper, and image formation is performed. On the other hand in the photo conductor surface after an imprint, the toner which was not imprinted remains, cleaning equipment removes this residual toner, and it prepares for new image formation. Although the toners removed by cleaning equipment are discarded after they are collected in cleaning equipment, they have the problem that the problem of the environmental pollution by the complicatedness which does an abandonment activity whenever the container for toner recycling is full in this case, and the abandonment toner, and use of a developer do not accomplish effectively.

[0003] For this reason, with the image formation equipment using a monochromatic toner, the toner cleaned and collected is returned in a development means, and the toner recycle device again used for development has been widely used recently, for example so that it may be indicated by JP,56-21175,A. Moreover, also about the toner, as technology of decreasing an abandonment toner, the conveyance nature and endurance of a ** toner are raised, and the configuration of a toner is improved, or in the toner of dry type 2 component development, the method of improving toner particle size distribution is proposed so that it may be indicated by JP,2-157765,A, so that it may be indicated by JP,1-214874,A and JP,2-110572,A.

[0004] In recent years, by development of a computer, color facsimile, a color printer, etc., the need of full color image formation equipment is growing, and the recovery toner has also been increasing in connection with this. About disposal of such a recovery toner, it is full color and the need for toner recycle has been emphasized rather than monochrome image formation equipment with full color image formation equipment from problems, like that the container stored in order that the amount of toners to be used may discard a recovery toner, since many [compared with the amount of toners used in one color] is enlarged, and the material of harmful nature is included. However, when toner recycle is performed in conventional full color image formation equipment, Since the imprint residual toner is considered as the configuration which cleans with a cleaner etc. and brings the collected waste toner together in the shared container for waste toner recycling after developing the electrostatic latent image on a photo conductor with the development means of each color and imprinting to a transfer paper, The collected waste toner was not able to change into the condition that the toner of each color was mixed, and was not able to be again used for color development.

[0005] As a method of coping with this problem, it has toner cleaning equipment only for two or more photo conductors for every color, and each photo conductors, the toner image of each color is formed, the toner which remains on two or more photo conductors with which the imprint was performed is cleaned according to an individual, and the technology which collects in the container for toner recycling according to color, and is again used for development is indicated by JP,9-288397,A.

[0006]

[Problem(s) to be Solved by the Invention] However, there is a problem shown below in the above-mentioned Prior art. Although the method indicated by JP,9-288397,A is enabling toner recycle in full color image formation equipment by preparing two or more photo conductors for every color, and collecting each color toners according to a color with the toner cleaning equipment of dedication, color mixture occurs in fact. As a result of analyzing the cause of such color mixture, it became clear that some toner images already imprinted with the development means in the upstream of the development means carried out reverse transcription to a photo conductor, and it was mixed in a cleaning means with the transfer residual toner at the production process which imprints the color toner image arranged at the development means. And since this reverse transcription phenomenon cannot be abolished completely, in above equipment, color mixture is unavoidable.

[0007] This invention is offering the color picture formation equipment which toner recycle is performed while it accomplishes in view of the above troubles and the purpose's reduces the development trouble by the color mixture of a toner in color picture formation equipment, and can form a color picture with a good passage at a long period of time.

[0008]

[Means for Solving the Problem] In order to solve the above-mentioned trouble, invention according to claim 1 Two or more image support by which an electrostatic latent image is formed in the surface Two or more developers which consist of a mutually different coloring agent are held. Two or more developers developed with said developer which has a coloring agent which corresponds an electrostatic latent image formed in each of two or more of said image support, Two or more cleaning means to remove and collect developers of a surplus which remains on said two or more image support for every image support, It has a toner recycle means to return a toner collected by said cleaning means in each developer. While piling up and imprinting a toner image formed on said two or more image support on a record medium one by one and obtaining the last image In color picture formation equipment which uses again each developer removed from said two or more image support A coloring agent with which said two or more developers differ offers color picture formation equipment which has the same electrification polarity.

[0009] Invention according to claim 2 offers color picture formation equipment according to claim 1 with which a coloring agent with which said two or more developers differ has the same binding resin.

[0010] Invention according to claim 3 offers color picture formation equipment according to claim 1 or 2 with which a coloring agent with which said two or more developers differ has almost same particle size distribution.

[0011] Invention according to claim 4 offers claim 1 in which said developer has the same specification, and color picture formation equipment according to claim 2 or 3.

[0012] Invention according to claim 5 is a 2 component developer which holds a two component developer to which said developer changes from a toner and a carrier. Said two or more developers offer claim 1 which has the same carrier, claim 2, and color picture formation equipment according to claim 3 or 4.

[0013]

[Embodiment of the Invention] Hereafter, the gestalt of operation of the color picture formation equipment of this invention is explained based on drawing. Drawing 1 is the outline block diagram showing claim 1 of this invention, claim 2, claim 3, and color picture formation equipment according to claim 4 or 5. This color picture formation equipment is a full color system which has the photo conductor of the shape of four drum, and has the four image formation sections which the first image formation section 9-1, the second image formation section 9-2, the third image

formation section 9-3, and the fourth image formation section 9-4 became independent of. These image formation sections 9-1, 9-2, 9-3, and 9-4 It is arranged the photo conductor 1-1 which is image support, respectively, 1-2, 1-3, 1-4, and near the peripheral surface of a photo conductor. The surface of a photo conductor on the surface of an electrification means 2-1 by which it is charged uniformly, 2-2, 2-3, 2-4, a photo conductor 1-1, 1-2, 1-3, and 1-4 The coloring toner corresponding to the exposure means 3-1 for exposing and writing in the image data whose color was separated, 3-2, 3-3, 3-4, and the image data whose color was separated is held. A corresponding coloring toner image A cleaning means 6-1 to remove the transfer residual toner on a development means 4-1 to form, 4-2, 4-3, 4-4, an imprint means 5-1 to imprint the toner image formed on the photo conductor on the recording paper, 5-2, 5-3, 5-4, a photo conductor 1-1, 1-2, 1-3, and 1-4, 6-2, 6-3, It has 6-4, a recycle means 8-1 to return the transfer residual toner collected by the cleaning means in the development means 4-1, 4-2, 4-3, and 4-4, 8-2, 8-3, and 8-4 grade. The sequential array of the above-mentioned photo conductor 1-1, 1-2, 1-3, and 1-4 is carried out along the conveyance direction of the conveyance belt 7, and the above-mentioned imprint means 5-1, 5-2, 5-3, and 5-4 are arranged so that it may counter on the surface of a photo conductor through this conveyance belt 7.

[0014] The above-mentioned photo conductor 1-1, 1-2, 1-3, and 1-4 consist of an OPC drum, and are supported pivotable in the direction of an arrow head. The above-mentioned development means 4-1, 4-2, 4-3, and 4-4 While holding in the interior the black toner B which is the cyanogen toner C which are the Magenta toner M which are the yellow toner Y which is a toner of the first color, respectively, and a toner of the second color, and a toner of the third color, or a toner of the fourth color It is arranged in the location adjacent to the surface of a photo conductor 1-1, 1-2, 1-3, and 1-4. It has the toner feed roller arranged in the back upper part of the developing roller supported so that it may rotate in the hand of cut of a photo conductor, and the direction of reverse, and a developing roller, and the toner within a development means is supplied to a developing-roller side by the toner feed roller, and is pumped up on the surface of a developing roller. The above-mentioned conveyance belt 7 moves in the direction of an arrow head, being laid with two rollers which rotate in the direction of an arrow head, and the recording paper is conveyed in the imprint location in which the imprint means 5-1, 5-2, 5-3, and 5-4 were arranged.

[0015] Actuation of the above-mentioned full color system is explained. When this full color system performs image formation, the surface of the photo conductor 1-1 of the four image formation sections 9-1, 9-2, 9-3, and 9-4, 1-2, 1-3, and 1-4 is first charged uniformly, respectively by the electrification means 2-1, 2-2, 2-3, and 2-4. Then, by the exposure means 3-1, 3-2, 3-3, and 3-4, it exposes to the image data whose color was separated, and an electrostatic latent image is formed. Thus, the electrostatic latent image formed in the surface of a photo conductor 1-1, 1-2, 1-3, and 1-4 is conveyed with rotation of a photo conductor to the development means 4-1, 4-2, 4-3, 4-4, and the development field that counters. On the other hand in development means 4-1, 4-2, 4-3, and 4-4, the yellow toner and Magenta toner and cyanogen toner or black toner is held, respectively, these toners are conveyed by the toner feed roller at a developing-roller side, respectively, and it is pumped up on a developing roller with rotation of a developing roller, it is conveyed to a development field, an electrostatic latent image is adsorbed, and the toner image of each color is formed. The toner image by the yellow toner of the first image formation section 9-1 is first imprinted by the recording paper which the toner image of each color formed in the surface of a photo conductor 1-1, 1-2, 1-3, and 1-4 was conveyed by rotation of a photo conductor in the location where the imprint means 5-1, 5-2, 5-3, and 5-4 have been arranged further, and has been conveyed with the conveyance belt 7. The recording paper with which this yellow toner image was imprinted The conveyance belt 7 top is conveyed and sequential migration is carried out to the second image formation section 9-2, the third image formation section 9-3, and the fourth image formation section 9-4. After the toner image by the Magenta toner, the toner image by the cyanogen toner, and the toner image by the black toner pile up one after another and are imprinted as a full color image, it is conveyed by the fixing means which is not illustrated and the full color image to which the recording paper was fixed is formed.

[0016] The toner of each color which remained after the above-mentioned toner image imprint on the surface of a photo conductor 1-1, 1-2, 1-3, and 1-4 While exfoliating from the photo conductor surface, respectively with the toner blade in which was conveyed in the arrangement location of the cleaning means 6-1, 6-2, 6-3, and 6-4, and contact arrangement was carried out by rotation of a photo conductor on the surface of the photo conductor It is collected in the cleaning means 6-1, 6-2, 6-3, and 6-4, is guided through the recycle means 8-1, 8-2, 8-3, and 8-4 in the development means 4-1, 4-2, 4-3, and 4-4 from here, it is mixed with a new toner, and is again used for development.

[0017] With this operation gestalt, each image formation section 9-1, 9-2, 9-3, and 9-4 have been independent, and the cleaning means 6-1 of each image formation section, 6-2, 6-3, and 6-4 remove the toner which remains on the surface of the same photo conductor 1-1 of image formation circles, 1-2, 1-3, and 1-4. For this reason, although only the corresponding toner (a yellow toner, a Magenta toner, a cyanogen toner, or black toner) of Isshiki should exist in each cleaning means, the toner of two or more colors is intermingled in fact. The place which investigated the toner in the cleaning means 6-1, 6-2, 6-3, and 6-4 after image formation by this full color system, In the cleaning means 6-1 of the first image formation section, the toner (yellow toner) of the first color In the cleaning means 6-2 of the second image formation section, the toner of the first color and the toner (Magenta toner) of the second color In the cleaning means 6-3 of the third image formation section, the toner of the first color, the toner of the second color, and the toner (cyanogen toner) of the third color In the cleaning means 6-4 of the fourth image formation section, the toner of the first color, the toner of the second color, It turned out that the toners which the toner of the third color and the toner (black toner) of the fourth color exist, and exist in the Nth cleaning means of the image formation section are the toner of the Nth color, and a toner (N in however, this case the number of either 1-4) of all the colors before it.

[0018] Thus, as a result of analyzing the cause that the toner of two or more colors is intermingled in the cleaning means 6-1, 6-2, 6-3, and 6-4, it sets to the development means 4-1 of each image formation section, 4-2, 4-3, and 4-4. It became clear that some toner images already imprinted by the transfer paper in the image formation section arranged in the upstream of the image formation section carried out reverse transcription to a photo conductor, and it was mixing to the cleaning means with the transfer residual toner at the production process which imprints the toner image of the coloring toner held in the development means. When imprinting a toner image to a transfer paper with the toner (Magenta toner) of the second color held in the development means 4-2 of the second image formation section 9-2, for example, to this transfer paper In order to be the first image formation section 9-1, to already have imprinted the toner image by the toner (yellow toner) of the first color and for a part of this yellow toner image to carry out reverse transcription on the photo conductor 1-2 of the second image formation section, Two kinds of toners, a yellow toner and a Magenta toner, exist on a photo conductor 1-2 as a transfer residual toner. Since these toners are eliminated from a photo conductor 1-2 by the cleaning means 6-2 and are collected in the cleaning means 6-2, a yellow toner and a Magenta toner will be intermingled in the cleaning means 6-2.

[0019] Furthermore, the relation of the generating and the imprint conditions (conditions of the voltage impressed to an imprint means in order to generate the imprint electric field which move a toner to a transfer paper) of this reverse transcription phenomenon was investigated. Consequently, although the conditions from which the amount of reverse transcription toners serves as the minimum existed as shown in drawing 2 , it became clear that a reverse transcription toner was not set to 0. It was thought that migration from the recording paper of a reverse transcription toner to [from this result] a photo conductor side was performed depending on force other than electrostatic force. And since this force is uncontrollable, generating of a reverse transcription toner cannot usually be set to 0. Therefore, in a cleaning means, the following states on the assumption that a certain amount of color mixture exists.

[0020] Although filming will be caused into the material (a 2 component development method a carrier and a 1 component development method developing roller) to which frictional electrification of the toner is carried out or the fault of toner concentration control becoming

impossible etc. will arise if the toner which is not developed and which carried out color mixture is saved up in a development means. Big fault will not be produced if negatives are developed like [the amounts of toners of the upstream which carries out color mixture by reverse transcription etc. are very few in fact, and] the coloring toner originally held in the development means, without collecting in a development means. For this reason, as for the toner which carried out color mixture, it is desirable for negatives to be developed with an original toner and not to collect in a development means. It depends for a color mixture ratio on the amount of reverse transcription toners in the condition that a color mixture toner is also developed by coincidence. If the amount of toners which carries out color mixture by reverse transcription is made into 5% of the amount of development toners, a final color mixture ratio is also saturated with 5%.

[0021] In order to develop a color mixture toner in the usual development, with this operation gestalt, all of four development means for each colors were made into the same specification. Thus, the toner which carried out color mixture can be developed like the toner of an original color by developing negatives on the same conditions about a development means, using the member of the same specification especially as a developing roller. Moreover, with this operation gestalt, the following materials were used about the toner and the carrier using the two component developer which consists of a toner and a carrier. The toner considered electrification polarity of each color toner as minus, used as polyester resin all the binding resin that forms each color toner, made all the particle size distributions of each color toner further the mean particle diameter of $6.5**0.5$ micrometers, and about the carrier, each color used the same thing and it considered it as the configuration which performs reversal development. When the full color system of this operation gestalt which has such a configuration performed color picture formation, it was checked that a toner carries out color mixture and does not collect in a development means even if it carries out toner recycle, but the stable image quality is acquired.

[0022] In the above-mentioned configuration, since the electrification trains of each quality of the material differ when the toner with which binding resin differs between each color is used, a frictional electrification property changes, an action which is different with a color mixture toner and an original coloring toner cannot be shown, and the stable image cannot be obtained.

Moreover, when the particle size distributions of each color toner differ, particle size distributions differ with the toner which carried out color mixture, and an original coloring toner, a touch area with the material (a 2 component development method a carrier and a 1 component development method developing roller) by which frictional electrification is carried out to a toner changes, and a difference arises in the average amount of electrifications with a color mixture toner and an original coloring toner. For this reason, such a toner shows a mutually different action at the time of development, and affects image formation. For example, when mean particle diameter of all coloring toners is set to $6.5**0.5$ micrometers, By the case where set mean particle diameter of a black toner to $10.0**0.5$ micrometers, and mean particle diameter of all the toners (a yellow toner, a Magenta toner, and cyanogen toner) except a black toner is set to $6.5**0.5$ micrometers When the development which carries out toner recycle was compared and mean particle diameter of all coloring toners is made into the same range In the example which made only mean particle diameter of a black toner a different range from the mean particle diameter of other coloring toners, the selection phenomenon which the small coloring toner of mean particle diameter concentrates on the edge section of a solid image occurred to the color mixture toner and the original coloring toner having been developed similarly. Therefore, all the development means for each colors are made into the same specification, the electrification polarity of each color toner and particle size distribution are the same, and it turned out that it becomes possible to acquire the stable image quality, recycling a color toner by using the developer using the carrier same in a two component developer using the same binding resin.

[0023]

[Effect of the Invention] As explained above, the color picture formation equipment of this invention In the color picture formation equipment which is equipped with two or more image formation sections which it became independent of for [each] colors, and performs toner recycle The toner which carries out color mixture within a cleaning means by making electrification polarity of each color toner the same is developed like the coloring toner

beforehand held in each development means. By this Recycling a color toner, a reservoir within the development means of the toner which carried out color mixture can be prevented, and the stable image quality can be maintained.

[0024] Moreover, in the color picture formation equipment which is equipped with two or more image formation sections which it became independent of for [each] colors, and performs toner recycle, while making electrification polarity of each color toner the same By making the same the binding resin used for each coloring toner, unify the electrification train of each quality of the material, and an action is made in agreement with the toner which fixed the frictional electrification property and carried out color mixture, and the coloring toner beforehand held in a development means. By this The stable image quality can be acquired recycling a color toner.

[0025] Furthermore, in the color picture formation equipment which is equipped with two or more image formation sections which it became independent of for [each] colors, and performs toner recycle, while making electrification polarity of each color toner the same A touch area with the material which performs frictional electrification of a toner by making the same the particle size distribution of each color toner is unified, the amount of electrifications of a toner is set constant between each color toner, and thereby, the stable image quality can be acquired, recycling a color toner.

[0026] The stable image quality is maintainable, recycling a color toner by having two or more image formation sections which it became independent of for [each] colors further again, and making the same specification of two or more development means for [each] colors in the color picture formation equipment which performs toner recycle, while making electrification polarity of each color toner the same.

[0027] While having two or more image formation sections which it became independent of for [each] colors further again, making a development means into a 2 component development means in the color picture formation equipment which performs toner recycle and making the same electrification polarity of each color toner in the two component developer of each color, the stable image quality is maintainable, recycling a color toner by making the same the carrier in the two component developer of each color.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the outline block diagram showing the full color system which is 1 operation gestalt of the image formation equipment of this invention.

[Drawing 2] It is drawing showing the result of having investigated the relation of the reverse transcription phenomenon and imprint conditions which are generated by the full color system shown in drawing 1.

[Description of Notations]

- 1-1, 1-2, 1-3, 1-4 Photo conductor
- 2-1, 2-2, 2-3, 2-4 Electrification means
- 3-1, 3-2, 3-3, 3-4 Exposure means
- 4-1, 4-2, 4-3, 4-4 Development means
- 5-1, 5-2, 5-3, 5-4 Imprint means
- 6-1, 6-2, 6-3, 6-4 Cleaning means
- 7 Conveyance Belt
- 8-1, 8-2, 8-3, 8-4 Recycle means
- 9-1 First Image Formation Section
- 9-2 Second Image Formation Section
- 9-3 Third Image Formation Section
- 9-4 Fourth Image Formation Section

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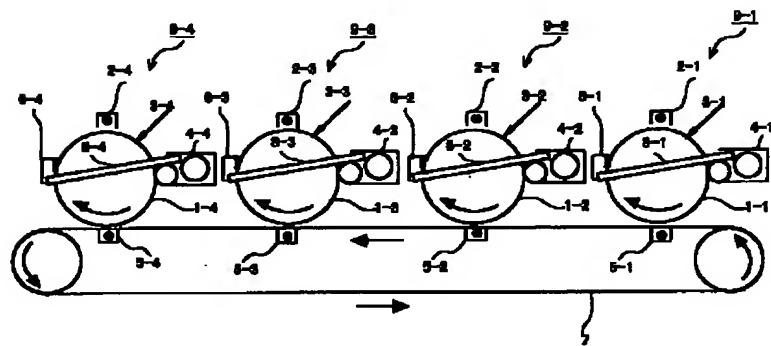
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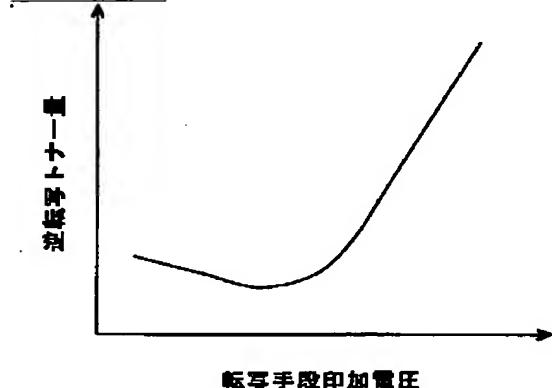
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DRAWINGS

[Drawing 1]



[Drawing 2]



[Translation done.]

同一の仕様とした。このように、現像手段について、特に現像ローラとして同一仕様の部材を用い、同一の条件下現像することにより、混色したトナーを本来の色のトナーと同様に現像することができた。また、本実施形態では、トナーとキャリアから成る二成分現像剤を用い、トナーとキャリアについて、以下のような材料を用いた。トナーは、各色トナーの帯電活性性をマイナスとし、各色トナーを形成する接着樹脂をすべてポリエチル樹脂とし、さらに、各色トナーの粒度分布をすべて平均粒径 $6.5 \pm 0.5 \mu\text{m}$ とし、また、キャリアについても、各色共、同一のものをを使用し、反転現像を行う構成とした。このような構成を有する本実施形態のフルカラーシステムでカラーパー画像形成を行ったところ、トナーサイクルを実施してもトナーが混色して現像手段に陷入せず、安定した画像品質が得られることが確認された。

【0022】上記の構成において、各色間で接着樹脂が異なるトナーを用いた場合には、各材質の帯電力が異なるため、摩擦帶電特性が変化し、混色トナーと本来の着色トナーとで異なる挙動を示し、安定した画像を得ることができない。また、各色トナーの粒度分布が異なる場合は、混色したトナーと本来の着色トナーとで粒度分布が異なり、トナーと摩擦帶電される材料(二成分現像方式ではキャリア、一成分現像方式では現像ローラ)との接触面積が変化し、混色トナーと本来の着色トナーとで平均的な帶電量に差が生じる。このため、このようなトナーは、現像時に互いに異なる挙動を示し、画像形成に影響を及ぼす。例えば、すべての着色トナーの平均粒径を $6.5 \pm 0.5 \mu\text{m}$ とした場合と、ブラックトナーの平均粒径を $10.0 \pm 0.5 \mu\text{m}$ とし、ブラックトナー及びビンクトナーの平均粒径を $6.5 \pm 0.5 \mu\text{m}$ とした場合で、トナーサイクルを実施する現像を比較したところ、すべての着色トナーの平均粒径を同一範囲とした場合には、混色トナーと本来の着色トナーとが同様に現像されたのに対し、ブラックトナーの平均粒径を他の着色トナーの平均粒径と異なる範囲とした例では、平均粒径の小さい着色トナーがベータ画像のエンド部に集中する過疎現象が発生した。したがって、各色用の現像手段をすべて同一仕様とし、各色トナーの帯電極性及び粒度分布が同一であり、同一の接着樹脂を用い、二成分現像剤では同一のキャリアを用いた現像剤を用いることにより、カラートナーのリサイクルを行いながら、安定した画像品質を得ることが可能となることがわかった。

【0023】【発明の效果】以上説明したように、本発明のカラー画像形成装置は、各色用の独立した複数の画像形成部を備え、トナーサイクルを行うカラー画像形成部が装置において、各色トナーの帯電活性性を同一とすることにより、

【0024】また、各色用の独立した複数の画像形成装置を備え、トナーサイクルを行うカラー画像形成装置において、各色トナーの帯電活性性を同一とすると共に、各色トナーに用いられる接着樹脂を同一とすることにより、各材質の帶電力を統一し、摩擦帶電特性を一定して混色したトナーと現像手段内に予め吸収される着色トナーとで挙動を一致させ、これにより、カラートナーのリサイクルを行なわながら、安定した画像品質を得ることができた。

【0025】さらに、各色用の独立した複数の画像形成装置を備え、トナーサイクルを行うカラー画像形成装置において、各色トナーの帯電活性性を同一とすると共に、各色トナーの粒度分布を同一とすることにより、トナーの摩擦帶電を行う材料との接触面積を統一し、トナーの帶電量を各色トナー間で一定とし、これにより、カラートナーのリサイクルを行なわながら、安定した画像品質を得ることができる。

【0026】さらに、各色用の独立した複数の画像形成装置を備え、トナーサイクルを行うカラー画像形成装置において、各色トナーの帯電活性性を同一とすることにより、各色用の複数の現像手段の仕様を同一としながら、安定により、カラートナーのリサイクルを行なながら、安定した画像品質を維持することができる。

【0027】さらに、各色用の独立した複数の画像形成装置を備え、トナーサイクルを行うカラー画像形成装置において、各色トナーの帯電活性性を同一とすると共に、各色トナーのリサイクルを行なう現像手段と二成分現像剤中のキャリアを同一とすることにより、各色トナーのリサイクルを行なながら、安定した画像品質を維持することができる。

【図面の簡単な説明】

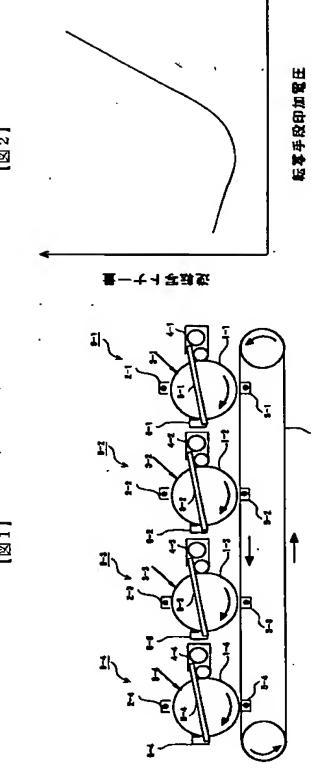
【図1】本発明の画像形成装置の一実施形態であるフルカラーシステムを示す框路構成図である。

【図2】図1に示すフルカラーシステムで発生する逆転現象と転写条件との関連を調査した結果を示す図である。

【符号の説明】

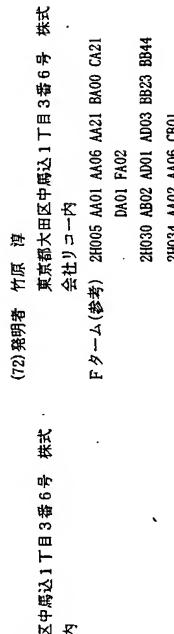
1-1、1-2、1-3、1-4 感光体
2-1、2-2、2-3、2-4 帯電手段
3-1、3-2、3-3、3-4 露光手段
4-1、4-2、4-3、4-4 現像手段
5-1、5-2、5-3、5-4 転写手段
6-1、6-2、6-3、6-4 クリーニング手段
7 輪ベルト

50 8-1、8-2、8-3、8-4 リサイクル手段



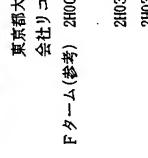
転写手段印加電圧

【図2】



着色トナー粒度

【図1】



【図2】

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